. . Attachment H

Proposal # 2001- K-208 (Office Use Only)

PSP Cover Sheet (Attach to the front of each proposal)

Proposal Title: Evaluation of Central Valley Floodplain Fish Rearing Habitat and Potential Losses from Stranding
Applicant Name: Foster Wheeler Environmental Corporation
Contact Name: Thomas C. Cannon
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Amount *of* funding requested: $ $133,123
Some entities charge different **costs** dependent on the source of the funds. If it is different for state or federal funds list below.
State cost _____ Federal cost _____

Cost share partners? ___Yes _X_ **No**
Identify partners and amount contributed by each _____

Indicate the Topic **for** which you are applying (check only one **box).**

- ☐ Natural Flow Regimes
- ☐ Nonnative Invasive Species
- ☐ Channel Dynamics/Sediment Transport
- ☐ Flood Management
- ☐ Shallow Water Tidal/ Marsh Habitat
- ☐ Contaminants
- ☐ Beyond the Riparian Corridor
- ☐ Local Watershed Stewardship
- ☐ Environmental Education
- ☐ Special Status Species Surveys and Studies
- ☒ Fishery Monitoring, Assessment and Research
- ☐ Fish Screens

What county or counties is the project located in? Sutter and Yuba

What **CALFED ecozone** is the project located **in?** See attached ***list*** and indicate number. **Be** as specific as possible # 8

Indicate the type of applicant (check only one **box):**

- ☐ State agency
- ☐ Public/Non-profit joint venture
- ☐ Local government/district
- ☐ University
- ☐ Other: _____
- ☐ Federal agency
- ☐ Non-profit
- ☐ Tribes
- ☒ Private party

Indicate the primary species which the proposal addresses (check all that apply):

- ☐ San Joaquin and East-side Delta tributaries **fall-run** chinook **salmon**
- ☒ Winter-run chinook salmon
- ☒ Spring-run chinook **salmon**
- ☐ Late-fall run chinook salmon
- ☒ Fall-run chinook salmon
- ☐ Delta smelt
- ☐ Longfin smelt
- ☒ Splittail
- ☒ Steelhead trout
- ☐ Green sturgeon
- ☐ Striped bass
- ☐ White Sturgeon
- ☐ All chinook species
- ☒ Waterfowl and Shorebirds
- ☐ All anadromous salmonids
- ☒ Migratory birds
- ☐ American **shad**
- ☐ Other listed T/E species: _____

Indicate **the type of** project (check only one **box):**

- ☒ Research/Monitoring
- ☐ Watershed Planning
- ☐ Pilot/Demo Project
- ☐ Education
- ☐ Full-scale lmplernentation

Is this a next-phase of an ongoing project? Yes ___ No X

Have you received **funds** from **CALFEO** before? **Yes** ___ No X

If *yes,* list project title and CALFED number _____

Have you **received** funding from **CVPIA** before? **Yes** ___ No X

If **yes,** list CVPIA program providing funding, project title and **CVPIA** number (if applicable):

_____

By signing **below,** the applicant **declares the** following:

- The truthfulness of **all** representations in their proposal;
- The individual signing the form is entitled *to* submit *the* application on behalf of **the** applicant (if the applicant is an entity or organization); and
- The person submitting **the** application has read and understood the conflict of interest **and** confidentiality discussion in the **PSP** (Section 2.4) and waives **any** and **all** rights to privacy **and** confidentiality of *the* **proposal** on **behalf** *of* the applicant. to the extent as provided in the Section.

G. LYNN SPRAGUE

Printed name of applicant

G. Lynn Sprague

Signature of applicant

FOSTER WHEELER ENVIRONMENTAL CORPORATION
Northern California Operations Manager

May 15,2000

CALFED Bay – Delta Program
1416 Ninth Street, Suite 1155
Sacramento, CA 95814

Subject: CALFED PROPOSAL

Foster Wheeler Environmental Corporation is pleased to submit the attached original proposal, ten complete hard copies, and one electronic copy to CALFED to conduct scientific research on the lower Feather and Yuba Rivers.

I am pleased to offer the services of Mr. Thomas Cannon as project manager and principal investigator. He has 16 years of service with Foster Wheeler and is one of our most experienced project managers and senior aquatic ecologists. He has a strong personal interest and commitment to the CALFED Program and the lower Feather and Yuba River ecosystems. Over the past several years he has dedicated considerable personal and company time staying on top of issues and scientific investigations on these rivers. I also offer the commitment of our company in support of the studies and the CALFED Program. Several years ago I was a member of the CALFED Management Team representing the US Forest Service. So I also have experience, interest, and commitment to the Program. As project sponsor I will be available to promote the project and participate in professional and stakeholder activities.

In addition to **Mr.** Cannon, we offer the services of our most experienced fluvial geomorphologist, Dr. Thomas Stewart, and our GIS team. In addition to the standard ArcInfo/ArcView technology, we have just upgraded our office capabilities with new Pentium III computers and the most up to date ArcView software capabilities.

To provide experienced field survey capability and to make our proposal cost effective, we have teamed with the Fishery Foundation of California and graduate students at UC Davis.

The objective of the study is to provide technical information on fisb habitat use in the floodplain of the rivers. We believe the study will identify economically feasible measures to restore floodplain habitat, reduce stranding and predation stressors, and improve the flood bearing capacity of the rivers.

Sincerely,

G. Lynn Sprague
Northern California Operations Manager

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Title Page and Executive Summary

Evaluation of Central Valley Floodplain Fish Rearing Habitat and Potential Losses from Stranding **A** *Proposal to Conduct a Monitoring and Research Program to identify the Nature and Extent of Salmon, Steelhead, and Splittail Use of Floodplain Habitats and Potential for Stranding on the Lower Feather and Yuba Rivers in Yuba and Sutter Counties, California.*

Submitted by:
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In partnership with:
The Fishery Foundation of California

With support from: Agencies and organizations with substantial property ownership in the lower Feather and Yuba River floodplains who have supported ongoing fish stranding evaluations on their properties include: California Audubon (Bobelaine Wildlife Sactuary), California Department of Fish and Game Lower Feather River Wildlife Area (Region 2), and California Department of Water Resources/Reclamation Board.

Summary of Proposed Research: Foster Wheeler Environmental Corporation (FWENC) and Fishery Foundation of California (FFC) propose to study fish habitat use and stranding in the lower Feather and Yuba River floodplains. The proposed study is immediate directed research to improve our understanding of the importance of floodplain habitat and the extent of stranding and consequences thereof for wild salmon and steelhead populations of the Central Valley. Stranding and floodplain habitat quality on the lower Feather and Yuba Rivers have been identified as important limiting factors in need of study by CALFED (PSP p. 47) and CVPIA (PSP Attachment G, p. **10).** Permanent and seasonally inundated floodplain habitats will be identified and mapped. Surveys of fish using and/or stranded in these habitats will be conducted. The focus will be on chinook salmon, steelhead, splittail, and resident native fishes. Competition and predation by non-native resident fishes will also be documented. Habitat conditions and relationship to species and life stage use will also be documented. Habitat and stranding areas will be mapped in GIS. Hypotheses being tested include: (1) are river floodplains important rearing habitats for juvenile salmon and steelhead, (2) are juvenile salmon and steelhead stranded in river floodplain habitats, (3) are floodplain stranding and rearing important factors in salmon, steelhead, and splittail population dynamics. The study involves (1) seasonal sampling of fish in the floodplain, (2) mapping floodplain habitats from available maps and aerial photos, (3) GIS mapping of seasonal rearing habitat and stranding areas of salmon, steelhead, and splittail, and (4) evaluation of the importance of seasonal habitat and stranding to fish populations. The studies will be coordinated with (1) DFG's juvenile screw trapping in the lower Yuba River, (2) CALFED/YCWA/UC Davis steelhead trapping, habitat, and life history studies in the lower Yuba River, (3) DWR studies on the lower Feather River below Oroville, (4) the US Army Corps of Engineers Sacramento and San Joaquin River Basins Comprehensive Study, and (5) Yuba River Fisheries Technical Working Group's CALFED grant study to develop and ecosystem restoration implementation plan for the lower Yuba River.

Project Description

Foster Wheeler Environmental Corporation (FWENC) and its partner the Fishery Foundation of California request funds from CALFED and CVPIA to conduct targeted fisheries-related research on the lower Feather and Yuba River floodplains. Technical information derived from this research will be fundamental in determining the extent and importance of river floodplain rearing and stranding to salmon, steelhead, splittail, and native resident fishes in the Central Valley. Information will also be valuable in developing prescriptions for protecting and enhancing floodplain habitats and reducing stranding. Information from this study will improve our understanding of the ecological and physical processes affecting the salmon and steelhead populations of the lower Feather and Yuba Rivers, as well as other rivers of the Central Valley. What we learn in these studies will be instrumental in designing future pilot projects and the ultimate implementation of restoration actions on Central Valley river floodplains.

1. Statement of the Problem and Purpose

a. Problem and Purpose

Lower river floodplains in the Central Valley are confined by flood control levees that have led to restricted floodplains, altered geomophic configurations, modified habitats, and stranding of salmon, steelhead, splittail, and native resident fish species. Nearly all the lower portions of the Feather and Yuba River channels are confined by federal, state, and local levees. Levees and bank protection confine the channel and restrict flood flows to a narrow river floodplain, which leads to unnatural river and floodplain configurations and unnatural habitat that causes stranding. The problems are exacerbated by remnant sediments from historic placer mining that have washed downstream in the river floodplains over the past century and have built up in and along the river channel on high terraces on the riverside of the levees. Gravel mining and levee construction borrow pits also have contributed to the problem. Borrow pits are often located next to the levees within the higher terraces. Flood control maintenance over the years has also removed floodplain riparian vegetation and large woody debris that are important contributors to floodplain processes and habitats. Riparian forests have also declined with age and from fires. Little information is available on the floodplain aquatic habitat or their importance for fish rearing or stranding in Central Valley river floodplains.

The purpose of the proposed monitoring and research is to determine (1) the importance of river floodplain rearing, (2) what habitats are important, (3) what conditions lead to stranding, and (4) what actions can enhance rearing habitat and reduce stranding. The objective of the proposed studies is to collect information and address these questions.

b. Conceptual Models, Hypotheses, and Adaptive Management

With salmon and steelhead production being confined to the lower Feather and Yuba rivers below dams, floodplain rearing and stranding become important population controls. The following conceptual models and hypotheses outline what selected floodplain habitat factors may control the populations and where there are uncertainties. Uncertainties identified preclude pilot or full-scale implementation of floodplain habitat enhancement actions. The goal of the proposed directed research efforts is to address the uncertainties so that pilot and full-scale implementation can begin to improve floodplain habitat and improve survival and production of salmon, steelhead, splittail, and native resident fishes.

A. Rearing of iuvenile salmon, steelhead. splittail. and resident native fishes in lower rivers and adiacent floodplain habitats – With construction of dams on the lower Yuba River (Englebright) and Feather River (Oroville) salmon and steelhead populations have been forced to spawn and rear in the lower rivers and floodplains. In both rivers, spawning reaches below the dams are in and immediately below foothill canyons with river channels confined by canyon

walls, high terraces, or dredge tailings. With the normal higher flows of winter, fry salmon move quickly through these confined channels to the lower Feather River, Sacramento River, and the Delta to locations that have more abundant shallow-water, low-velocity habitat for rearing. Screw traps monitored at the lower ends of spawning reaches in both rivers indicate that most emigration of young salmon from spawning reaches occurs as fry during winter high flow periods (McEwan 1999). Fry also reach the Delta in higher numbers in high flow periods (McLain and Burmester 1999).

Juvenile salmon produced in the Feather and Yuba Rivers spend a portion of their downstream migration period in the lower Feather and Yuba Rivers below the spawning reaches. How important is juvenile rearing in these approximately 35 miles of river floodplain? Is survival of young fish in this reach a factor in population abundance? In wet years the lower 10 miles are part of the Sutter Bypass, and thus carry the majority of the Sacramento River flow. How important is this lower reach for rearing juvenile salmon from the Sacramento River? Do juvenile salmon from the Sacramento River and its upper tributaries move even further up into the lower Feather floodplain to rear as observed in smaller Sacramento tributaries (Maslin et al. 1997), the lower American River floodplain (Jones and Stokes Associates 1999), and along the Fraser River in British Columbia (Murray and Rosenau 1989)?

Hypothesis A1: Juvenile salmon use the low velocity habitats of the lower Feather and Yuba rivers and adjacent floodplains.

Hypothesis A2: Juvenile salmon grow rapidly in the low velocity habitats of the lower rivers and adjacent floodplains.

Hypothesis A3: Juvenile salmon, steelhead, and splittail rearing in floodplain habitats are subjected to competition and predation from non-native species.

Hypothesis A4: Juvenile steelhead remain in upstream spawning reaches and do not use lower velocity habitats of the lower rivers and their adjacent floodplains.

Hypothesis AS: Splittail spawning and rearing in the Feather and Yuba rivers are confined to the lower Feather River floodplain.

B. Floodplain configurations that lead to stranding – The combination of high sediment loads, confinement by levees, bank protection, and borrow pit construction has resulted in unnatural habitat features in the lower river floodplains that are conducive to stranding of salmon, steelhead, and splittail. A similar phenomenon was observed upon decrease in flows in the Trinity River when fry were stranded in isolated pools behind riparian berms (p. 84, USFWS 1999). Warren Shaul (Jones and Stokes Associates, personal communication) also observed this phenomenon in the Sacramento and Sutter Bypasses, along the lower Feather River floodplain, and in the lower American River floodplain (Jones and Stokes Associates 1999).

Hypothesis B1: Borrow pits dug from terraces along the river channel for levee construction along with other off-channel habitats have the potential to strand juvenile salmon.

Hypothesis B2: Levees, borrow construction, bank protection, mining debris, large woody material removal, land use practices, and road and bridge construction contribute to floodplain configuration that has greater potential stranding of juvenile salmon, steelhead, and splittail.

Hypothesis B3: Young salmon, steelhead, and splittail are attracted to floodplain habitats during high water and become stranded when water recedes.

C. Importance of floodplain rearing to fish populations – Floodplain habitat rearing may be important to salmon, steelhead, and splittail populations in both positive and negative ways. Floodplain habitats provide low velocity rearing habitats with abundant food supply, cover, feeding habitat, and warmer water in winter, and protection from predators. These factors may lead to faster growth, higher survival, earlier smolting, greater production of smolts, and larger

smolts that in combination would lead to more smolts reaching the ocean with a greater chance of survival once in the ocean. Floodplain rearing may also lead to higher rates of predation and eventual loss to stranding than would otherwise occur in an undisturbed floodplain or if young fish moved downstream to the Delta. Although there are no data that directly ties floodplain habitat conditions to population abundance of salmon, steelhead, or splittail, such cause-and-effect relationships between the physical conditions of the floodplain and the fish populations can be evaluated with supporting information provided in the proposed study. Previously developed theories relating fish production with riparian habitat conditions on higher order stream segments (Barton et al. 1985, Naiman et al. 1993) can be expanded to lower river floodplain habitats. Studies on the lower Trinity River found that limited availability of suitable low-velocity habitats severely limits fry survival from mid-winter through spring (p. 228, USFWS, 1999).

Hypothesis C1: Rearing of salmon, steelhead, and splittail in lower river floodplain habitats leads to higher growth, higher survival, and earlier emigration to the estuary than rearing in main river habitats.

Hypothesis C2: Predation and stranding in floodplain habitats leads to poor overall survival and reduced smolt production than would otherwise occur.

Hypothesis C3: Floodplain rearing is a bottleneck for the salmon population.

Hypothesis C4: Juvenile salmon rearing in lower-river, low-velocity habitats is important to overall smolt production and eventual population abundance and adult escapement.

D. Potential improvements to floodplains that would lead to higher quality rearing habitat, reduced stranding, and greater population abundance – Improvements to floodplain habitats could increase the amount of high-quality rearing habitat, reduce habitat favorable to non-native species, and reduce the potential for stranding of salmon, steelhead, and splittail. Such improvements could lead to improved growth and survival, higher smolt production, better Bay-Delta and ocean survival, and improved escapement of wild salmon and steelhead to the Feather and Yuba Rivers. Potential improvements would be studied in an adaptive management framework to provide the greatest population improvement per unit cost. A critical element for any floodplain improvement will be compatibility with flood control. Habitat improvements that lead to improvement in the flood bearing capacity of the channel will be more readily accepted and implemented. The Reclamation Board (DWR) has been applying such techniques in the lower Feather River floodplain in conjunction with the need for borrow material to upgrade and repair levees. Off-channel habitats have been identified and studied for many years as key rearing areas for anadromous salmonids (Sedell and Luchessa 1982, King and Young 1986, Department of Fish and Oceans 1980, and Marshall 1978). They are also often very productive habitats (Cooper 1991, Maslin et al. 1997) and important for river ecosystem function (Gregory et al. 1991, Cederholm 1994). Restoration of the ecosystem structure and function of the floodplain will be the target, but recognizing that *"habitat restoration is really a pragmatic mix of protection and rehabilitation to some improved level consistent with the multiple use of the watershed"* (Murphy 1995).

Hypothesis D1: Borrow pit habitat can be improved to reduce stranding and predation on juvenile salmon, and provide value as rearing habitat.

Hypothesis D2: Excavation of high terraces and high banks could improve riparian and wetland habitats along the river channel.

Hypothesis D3: Construction of sloughs, side channels, and wetlands in the floodplain would provide additional rearing habitat.

Hypothesis D4: Improving hydraulic connections of floodplain habitats would improve habitat and reduce stranding.

Hypothesis D5: Improvements in habitat and reduction of stranding would lead to improvement in populations of salmon, steelhead, and splittail.

2. Proposed Scope of Work

The following scope of work identifies the specific proposed targeted research that addresses uncertainties and hypotheses identified above.

a. Location and Geographic Boundaries of the Project

The proposed research would occur along the lower Feather and Yuba Rivers in Yuba and Sutter Counties from the mouth upstream on the Feather River and above Marysville on the Feather River and into the lower Yuba Rivers (Figure 1). The mouth of Honcut Creek is the upper extent on the Feather River. Honcut Creeks is also the lower end of the DWR study area and spawning reach. Hallwood Boulevard is the approximate upper end of the study area on the Yuba River. This is the approximate lower end of the spawning reach and upper end of the levee-bank protection reach on the Yuba River. The study area is part of the Feather River Sutter Basin Ecological Zone.

b. Approach

The following sections describe the approach to addressing the hypotheses described above. Each section is organized by hypotheses that relate directly to the uncertainties and project objectives.

A. Rearing of juvenile salmon, steelhead, splittail, and resident native fishes in lower rivers and adjacent floodplain habitats –

Hypothesis A1: Juvenile salmon use the low velocity habitats of the lower rivers and adjacent floodplains.

Task **A1:** Monitor juvenile fish in floodplain habitats of the lower Feather and Yuba Rivers. Study area floodplain habitats will be sampled seasonally with seine and electroshocking gear to determine species composition and relative abundance of juvenile fish in borrow ponds, sloughs, and lakes in the leveed reaches above and below Marysville and downstream to the mouth of the Feather River. Juvenile salmon, steelhead, and splittail would be targeted from late fall through early summer. Three two-week sampling surveys in the river floodplain habitats will be conducted during a six-month period. Numbers, weight, and size of fish, habitat conditions will be measured including water temperature, turbidity, water depths, cover characteristics, and water velocity. Sampling will also be conducted on the river margins adjacent to the floodplain habitats sampled for comparison. Continuous temperature recorders will be maintained in representative surveyed habitats.

Hypothesis A2: Juvenile salmon grow rapidly in the low velocity habitats of the lower rivers and adjacent floodplains.

Task **A2:** Growth rates in terms of weight and length from river and floodplain fish will be developed from length and weight data from sampled fish and comparisons made between the river and floodplain growth. Potential biases from emigration and immigration on growth rates will be considered by tracking different sized groups in the population length data, sources of newly spawned recruits (e.g., from sampling at the upper end of the study area), and emigrants from the lower portions of the study area. Growth rates will be compared in relation to habitat conditions in various habitats types surveyed.

Hypothesis A3: Juvenile salmon, steelhead, and splittail rearing in floodplain habitats are subjected to poor habitat conditions including competition and predation from non-native species.

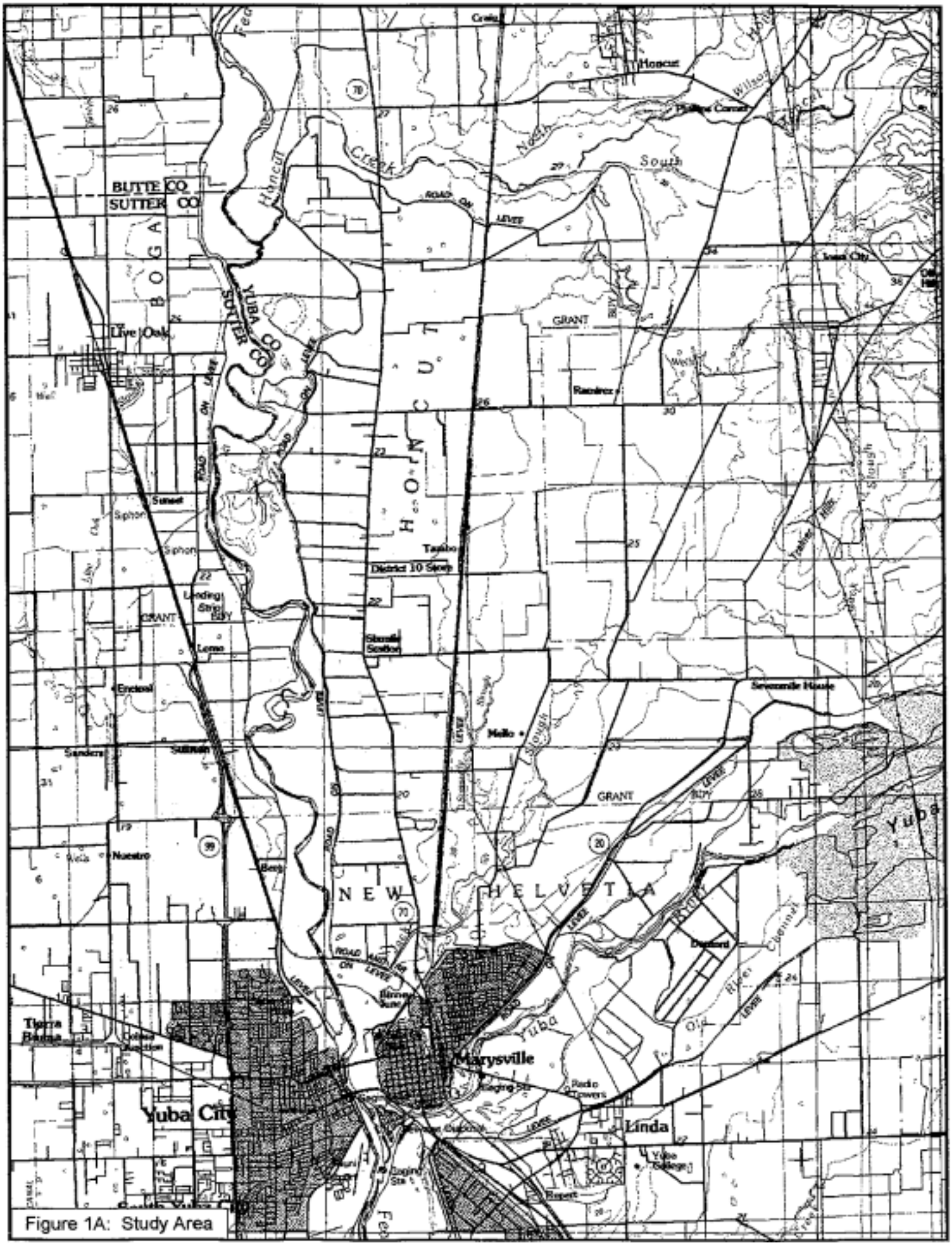


Figure 1A: Study Area

Figure 1B: Study Area

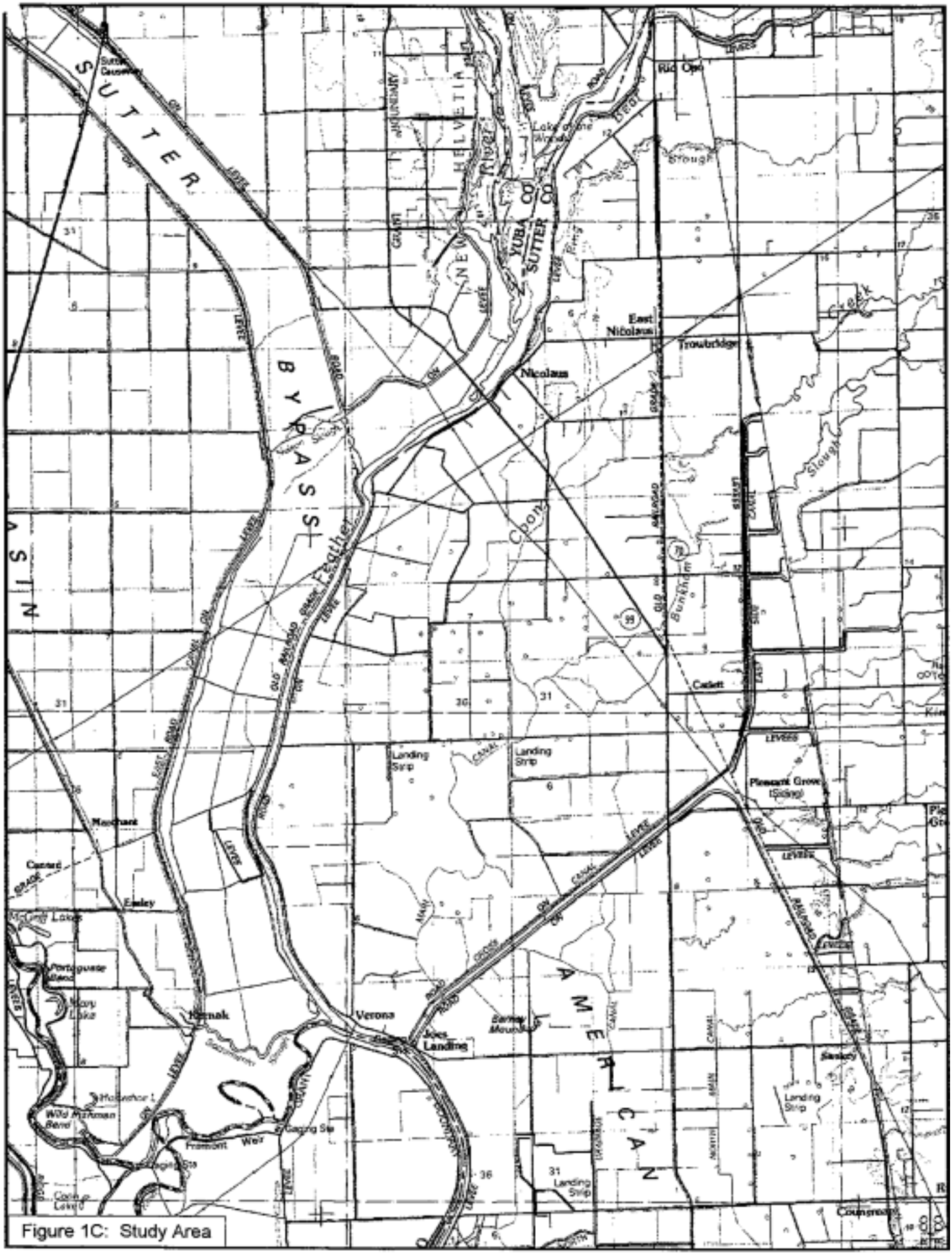


Figure 1C: Study Area

Task A3: Sampling surveys in Task A1 include collection of other fish species that may compete or prey upon juvenile salmon, steelhead, and splittail in floodplain and adjacent river habitats. Predatory fish such as pikeminnow, striped bass, carp, catfish, and centrarchids (black bass and crappie) will be captured with seines, traps, and gill nets, counted, and subsampled for prey analysis to determine relative abundance and predation rates.

Hypothesis A4: Juvenile steelhead remain in upstream spawning reaches and do not use lower velocity habitats of the lower rivers and their adjacent floodplains.

Task A4: The presence and relative abundance of steelhead in surveys conducted in Task A1 along with data collected in other studies from spawning areas in the lower Feather and Yuba rivers will address this hypothesis.

Hypothesis A5: Splittail spawning and rearing are confined to the lower rivers and floodplain habitat.

Task **A5:** Screw trap sampling data on splittail collected by DFG and DWR will be compared to survey data from Task A1 to address the relative use of splittail from upriver salmon spawning areas versus the lower river floodplains. DFG/IEP splittail survey data will also be used to determine the distribution of splittail spawning and rearing in the lower Feather, Yuba and Sacramento River floodplains.

B. Floodplain configurations that lead to stranding –

Hypothesis B1: Borrow pits dug from upper terraces of the river channel for levee construction along with other off-channel floodplain features have the potential to strandjuvenile salmon, steelhead, and splittail.

Task B1: Sampling surveys in Task A1 will provide information on potential stranding in borrow pits and other off-channel habitats. Physical information will be collected on mechanisms for stranding at major borrow pits and other floodplain features that have stranding of juvenile salmon, steelhead, and splittail. Frequency of inundation will be determined from available gage data related to elevation data available for each surveyed site.

Hypothesis B2: Channel configuration, levees, borrow construction, bank protection, mining debris, large woody material removal, land use practices, and road and bridge construction have contributed to floodplain configuration that leads to stranding of juvenile salmon, steelhead, and splittail.

Task B2: Floodplain features that contribute to stranding will be recorded in the field and depicted in project GIS maps. Channel configurations will be recorded and mechanisms controlling such configurations determined. Drainage patterns that lead to fish being concentrated in areas that eventually become isolated from the river channel will be identified and mapped.

Hypothesis B3: Young salmon, steelhead, and splittail are attracted to floodplain habitats during high water and become stranded when water recedes.

Task **B3:** Sampling survey data from Task A1 will be used to compare relative attraction of juvenile fish to flooded habitats, as well as after habitats become isolated when waters recede. Velocity, turbidity, water temperature, cover, and depths will be compared between floodplain habitats and river margin habitats.

C. Importance of floodplain rearing to fish populations –

Hypothesis C1: Rearing of salmon, steelhead, and splittail in lower river floodplain habitats leads to higher growth, higher survival, and earlier smolting than rearing in main river habitats.

Task C1: Information relative abundance and growth rates collected in tasks A1 and A2 will be compared for floodplain and adjacent river margin habitats. Data collected in these tasks will be analyzed for indications of higher growth rates and earlier smolting. Growth rates will be used to assess potential survival effects from rearing in different habitats.

Hypothesis C 2 Predation and stranding in floodplain habitats leads to poor overall survival and reduced smolt production than would otherwise occur.

Task C2: Predation and stranding rates determined from tasks **A** and B will be analyzed in a simple population survival model to depict the expected magnitude of the effect of predation and stranding on overall smolt production and adult escapement from these two stressors. Potential effects of reducing predation and stranding rates on smolt production will be estimated and subsequent effect on escapement postulated. Ricker-type stock-recruitment models used will be used. Stock estimates will be derived from Yuba and Feather River escapement data. Predation and stranding rates will be treated as density independent factors affecting recruitment to the adult populations.

Hypothesis C3: Floodplain rearing is a bottleneck for salmon population survival.

Task **C3:** The population model in Task C2 will be expanded to show the potential role of floodplain rearing **as** a bottleneck to smolt production and adult escapement. Bottlenecks can take the form of density-dependent or independent mortality factors.

Hypothesis C4: Juvenile salmon rearing in the lower river low velocity habitats is important to overall smolt production and eventual population abundance and adult escapement.

Task **C4:** Numbers and timing of juvenile salmon rearing in floodplain habitats will be compared to estimates of fry, fingerling, and smolt recruitment from spawning reaches by DWR and DFG from screw trap sampling surveys. The relative potential contribution of juvenile salmon rearing in floodplain habitats to total smolt production and adult escapement will be hypothesized from simple stock-recruitment population models developed in other task C's. Fry to smolt Ricker-type population models will be developed that relate fry survival to smolt production. Smolt-to-escapement model will be linked to the fry-smolt model to relate fry survival to adult escapement.

D. Potential improvements to floodplains that would lead to better growth, reduced stranding, and greater population abundance –

Hypothesis D1: Borrow pit and other floodplain habitats can be improved to reduce stranding and predation on juvenile salmon, and provide value as rearing habitat.

Task D1: Task B2 will be expanded to address potential measures for improving borrow pit and other floodplain habitats by reconfiguring floodplains and providing connections to the river. Preliminary conceptual designs and maps will be prepared.

Hypothesis D2: Excavation of high terraces and high banks could improve riparian and wetland habitats along the river channel.

Task D2: Task B2 will be further expanded to evaluate options to reduce high terraces and banks to provide riparian and wetland habitats. Preliminary conceptual designs and maps will be prepared. Implications to wildlife including the yellow-legged frog, western pond turtle, giant garter snake, and Swainson's hawk will also be assessed.

Hypothesis D3: Construction of sloughs, side channels, and wetlands within the floodplain would provide additional rearing habitat.

Task **D3:** Task B2 will be further expanded to evaluate options to construct sloughs and side channels to provide additional rearing habitat. Preliminary conceptual designs and maps will be prepared.

Hypothesis D4 Improving hydraulic connections of floodplain habitats would improve habitat and reduce stranding.

Task D4: Task B2 will be further expanded to show options for improving floodplain circulation to improve habitat and reduce stranding. Preliminary conceptual designs and maps will be prepared.

Hypothesis D5: Improvements in habitat and reduction of stranding would lead to improvement in populations of salmon, steelhead, and splittail.

Task D5: Habitat improvements described above will have effects on smolt production and adult escapement. Population models developed in Task C's will be modified to show potential population benefits of habitat improvements. Habitat improvements can effect density-dependent and independent mortality factors as well as the bottleneck features in the models.

E. Project Management

Task E – Project Management: Foster Wheeler Environmental Corporation (FWENC) would serve as project manager and grant recipient. FWENC and the Fisheries Foundation would conduct research elements. The project management team will be responsible for ensuring completion of the study scope. Activities include data handling and storage, reports, presentations, as well as project performance, communication, administration, and contracting activities. The project manager will ensure that project team members have the resources needed to conduct the tasks and will be responsible for safety on the project. The project manager will prepare a public involvement plan. The project manager and fish study leaders will develop a quality assurance program plan (QAPP). The project manager and fish study leaders will be prepared to make project presentations at annual review meetings.

c. Data Handling and Storage

All data will be maintained in database (Microsoft Access) or spreadsheet (Microsoft Excel) format and updated in a master ArcView database by the project manager. Individual task leaders will maintain databases. Databases will be transferred to the CVPIA Comprehensive Assessment and Monitoring Program (CAMP) and the Interagency Ecological Program (IEP). GIS maps in ArcView database files will also be developed for tasks involving habitat characterization and mapping.

d. Expected Products/Outcomes

Individual survey reports will be completed within 2 months of completion of each survey. Progress reports will be prepared monthly during sampling periods and bimonthly at other times. The project manager and task leaders will prepare a program final report for distribution at the end of the year. Periodic progress reports will be given to the Anadromous Fish Restoration Program, Interagency Ecological Program, and Yuba and Feather River technical groups.

e. Work Schedule

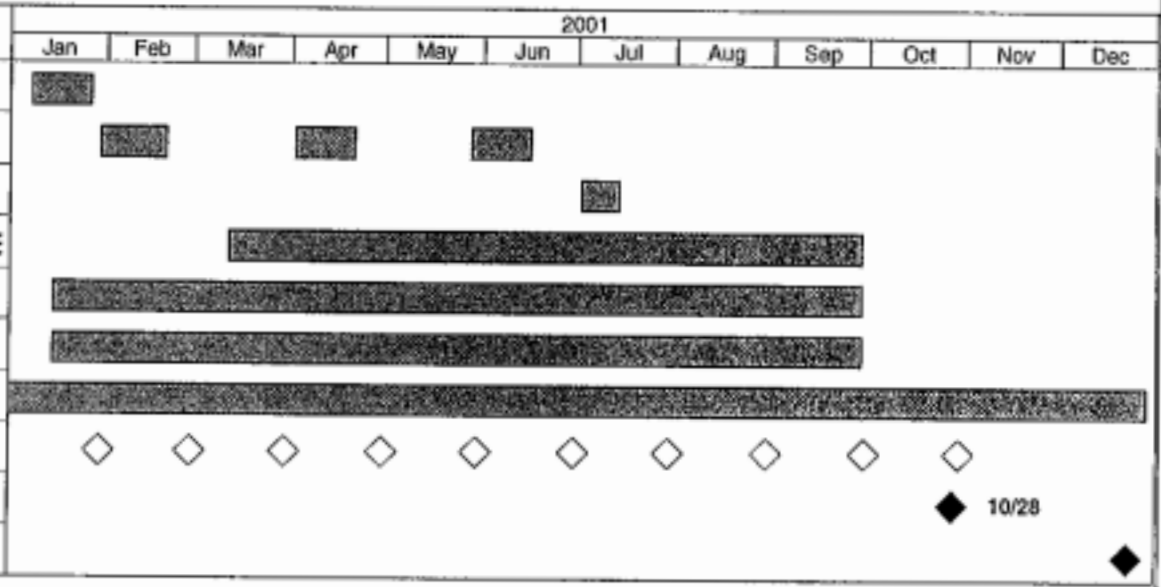
The proposed work schedule by task and key milestones is presented in Figure 2. All task are separable. Funding is proposed for 12 months. Additional funding may be requested in PSP 2002 or 2003 if surveys cannot be completed because of unforeseen circumstances.

f. Feasibility

The study team will need ESA research permits for the proposed sampling surveys and data collections. Sampling restrictions relating to the listed spring-run chinook and steelhead are anticipated and the survey sampling has been designed accordingly. Adjustments to the final study designs may be necessary because of limitations prescribed in ESA permits. One study year should provide a reasonable range of conditions and allow most of the proposed sampling and experimental work to be completed. In the event the study year is a critical water year and no inundation of the floodplain occurs, sampling surveys and analyses will be limited and project funds will be carried over to an additional year when floodplain inundation occurs. Many of the hypotheses can be addressed adequately with one year of survey data. Extreme flooding after large winter storms will hamper surveys. Sampling and experiments prescribed for the winter should be able to work around such extremes. Some work such as sampling fish in flooded habitats can be accomplished during extreme flooding. Access available to the river and to the government and private owned land of the floodplains is limited, but will be arranged with local reclamation districts, the Reclamation Board, DFG, and landowners such as Audubon. In most

Figure 2. Project Schedule

ID	Task Name
1	Task A Planning
2	**Task A: Field Surveys**
6	Task A Report
7	Task B Floodplain Configuration and Stra
8	Task C: Effects on Populations
9	Task D: Habitat Evaluation.
10	Task E: Project Management
11	**Monthly E-mail Status Reports**
22	Draft Report
23	Final Report



cases access to the study area by the general public is limited and thus potential conflicts with the public will be minimal. Access to the river and floodplain is available by boat. Most of the floodplain is in public ownership and accessible to the general public if only by boat. Stakeholder and agency groups will be called on to help ensure cooperation of the public and nearby landowners.

Applicability to CALFED ERP Goals and Implementation Plan and CVPIA Priorities

1. *ERP Goals and CVPIA Priorities*

Two factors listed in the CALFED Strategic Plan (p. D-18) that influence ecological health of Sacramento River basin pertain to the proposed study.

1. Loss of river-floodplain interactions because of levee construction.
2. Stranding of adult and juvenile anadromous and resident fish and the lack of hydraulic connectivity to river channels as floodwaters recede.

The proposed study is also consistent with a large number of CALFED and CVPIA priorities.

- Provide benefits to special status species.
- Restore ecological processes and habitats that are self-sustaining.
- Provide benefits to multiple species. (Studied habitats also important to riparian songbirds, Swainson's hawk, giant garter snake, yellow-legged frogs, and western pond turtles.)
- Improve understanding of ecosystem structure and function.
- Offer information richness.
- Provide results in a short time frame.
- Contribute to multiple program objectives.

The CALFED issues relating **to** a successful Program addressed by the proposed studies are the following:

- Introduced species (many of the fish predators being studied are introduced species)
- Channel dynamics, sediment transport and riparian vegetation.
- Floodplain management as an ecosystem tool – allowing rivers more access to floodplains.
- Shallow water freshwater marsh habitat.
- Bypasses as habitat (the lower Feather includes nearly 10 miles within the Sutter Bypass).

Other opportunities provided by the proposed studies for the CALFED and CVPIA programs:

- *Expand or enhance seasonal shallow-water habitat in the bypasses and near-delta floodplains while retaining or enhancing flood control.*
- *Initiate targeted research on factors limiting the abundance of high priority endangered species and design of habitats for shallow water and bypasses.*
- *Undertake floodplain restoration on a broad scale where land or easements can be acquired and where the river hydrology includes (or can be made to include) sufficiently high flows to inundate floodplain surfaces.*
- *Reduce stress on levees, reduce channel scour, and encourage riparian vegetation within the adjacent floodplain.*
- *Increase frequency of over-bank flooding on existing floodplains and reactivate historical floodplains.*
- *Undertake fluviogeomorphic studies before making large investments in restoration projects.*
- *Develop a partnership with the* ***Army*** *Corps of Engineers and Reclamation Board /DWR to fully integrate river and floodplain ecological restoration with flood management.*
- *Provide continuity – connecting river habitats from spawning grounds to delta nurseries – riparian corridors*

The proposed study also is consistent with the following CALFED, CVPIA, DFG, and FWS goals for restoring populations of Central Valley anadromous fish.

- *Support additional research to address large deficiencies in information on steelhead life history.*

Support in the development and implementation of floodplain habitat restoration measures and protections that have a relatively high degree of certainty of increasing number and size of salmon, steelhead, and splittail populations.

2. Relationship to Other Restoration Projects/ System Wide Benefits

Other studies have been and are now being conducted on the lower Feather and Yuba Rivers to improve anadromous fish production and ecological understanding. The studies in this proposal compliment and build on these and planned future studies. The California Department of Fish and Game (DFG), the Yuba County Water Agency (YCWA), and the US Fish and Wildlife Service (FWS) with funding from CALFED, AFRP, and YCWA have undertaken the following studies:

- YCWA carcass surveys each year to determine Yuba River chinook salmon escapement.
- DFG and Jones and Stokes Associates (under a grant from CALFED and YCWA) monitor adult fish passage through the fish ladders at the dam.
- DFG monitors downstream migrating Yuba chinook and steelhead numbers via screw trap.
- DFG also monitors juvenile salmon and steelhead numbers in the Hallwood-Cordura diversion location immediately above Daguerre Dam.
- UC Davis Department of Fish, Wildlife, and Conservation under a grant from YCWA has conducted surveys of the distribution of juvenile steelhead in the lower Yuba River in 1999 and 2000. Data from this study will help in evaluating potential timing of juvenile salmon and steelhead in the lower river floodplain.
- DFG and DWR mark salmon and steelhead at the Feather River hatchery prior to release. This information will be helpful in defining periods when hatchery fish use the floodplains of the lower rivers.
- DFG/IEP conduct splittail studies in the flooded floodplain of the lower Sutter Bypass. Data from these studies will be complimentary to those proposed.
- DWR also conducts studies above the proposed study area in the lower Feather River below Oroville and Thermolito dams. These studies include screw trap sampling that provides information on the timing and numbers of juvenile salmon and steelhead moving downstream into the lower reach of the Feather River. Additional studies are expected in the near future as part of the FERC relicensing program for State Water Project hydroelectric facilities at the Oroville complex upstream of the study area.

The proposed studies will complement other studies on fish habitat and stranding being conducted in the Central Valley. Results from these and the proposed studies will complement the information of the others and help determine the role floodplain habitats and stranding play in Central Valley salmon, steelhead, and splittail production.

The US Army Corps of Engineers and the Reclamation Board (DWR) are studying the lower Yuba River as part of the Sacramento and San Joaquin River Basins Comprehensive Study. The Reclamation Board owns much of the property in the lower Feather River floodplain. . Extensive data will be available from this study on the channel characteristics of the lower Feather and Yuba Rivers. DWR also has aerial photo surveys of the river that will help in delineating habitat in the lower rivers. Information obtained in the proposed study will also be of value to the Comprehensive Study to better understand the ecological role of channel and floodplain configuration of Central Valley rivers.

The project team will maximize the system-wide benefits by providing data and reports in a timely manner, participating in scientific and public forums, and in providing peer-reviewed publications of the research conducted.

Qualifications

The proposed project team includes a project management team with the project manager and study team leaders to oversee and document the project. Principal and supporting investigators will include professional scientists and students from Chico State University, the Fishery Foundation of California, and graduate students from UC Davis. The proposed organization chart for the project team is presented in Figure **3.**

The project management team will coordinate the various elements of the project and will also be responsible for project tracking, schedule, performance, budget, administration data base development, and reporting.

Fish Study Leaders:

Trevor Kennedy – Independent Contractor affiliated with the Fishery Foundation of California – Mr. Kennedy has participated in and managed fishery restoration and research projects in the Central Valley for five years. He has a B.S. in fisheries from Humboldt State University. His experience relevant to the proposed project includes (1) development and implementation of measures to improve fish passage on the Cosumnes River via the Cosumnes River Salmonid Passage Improvement Project (CALFED 98); and (2) development of methodologies to determine spatial and temporal densities and distribution of juvenile chinook salmon and steelhead within the Stanislaus River by direct observation. He has also contributed to the present understanding of how juvenile fish utilize floodplain habitats within the Cosumnes River and is currently working with the Anadromous Fish Restoration Program (AFRP) to determine habitat preferences, residence time, and the degree of stranding of juvenile chinook salmon within the Cosumnes River Preserve.

Jeff Kozlowski, UC Davis graduate student – Mr. Kozlowski is a fisheries biologist with 14 years of professional experience. He received his B.S. in Natural Resources Management (fisheries emphasis) from California Polytechnic State University. He has special expertise in fish population sampling techniques, fisheries impact assessments, stream habitat inventory procedures, stream restoration techniques, and reservoir fishery habitat enhancement. For the past 10 years, he has been a fisheries consultant performing field investigations and environmental impact assessments on a variety of projects in Northern California. He has performed field investigations on the Guadalupe River near San Jose, on the lower San Joaquin, American, and Yuba Rivers, and on numerous small coastal and Central Valley streams. Relevant experience includes performing annual chinook salmon carcass surveys to estimate spawning escapement, and seining and snorkeling surveys to monitor the size, condition, distribution, and relative abundance **of** juvenile chinook salmon and steelhead rearing in the lower Yuba River. Presently, Mr. Kozlowski is completing his masters program at the University of California at Davis where he is conducting research on the life history, distribution, and habitat use of juvenile steelhead/rainbow trout and chinook salmon rearing in the lower Yuba River.

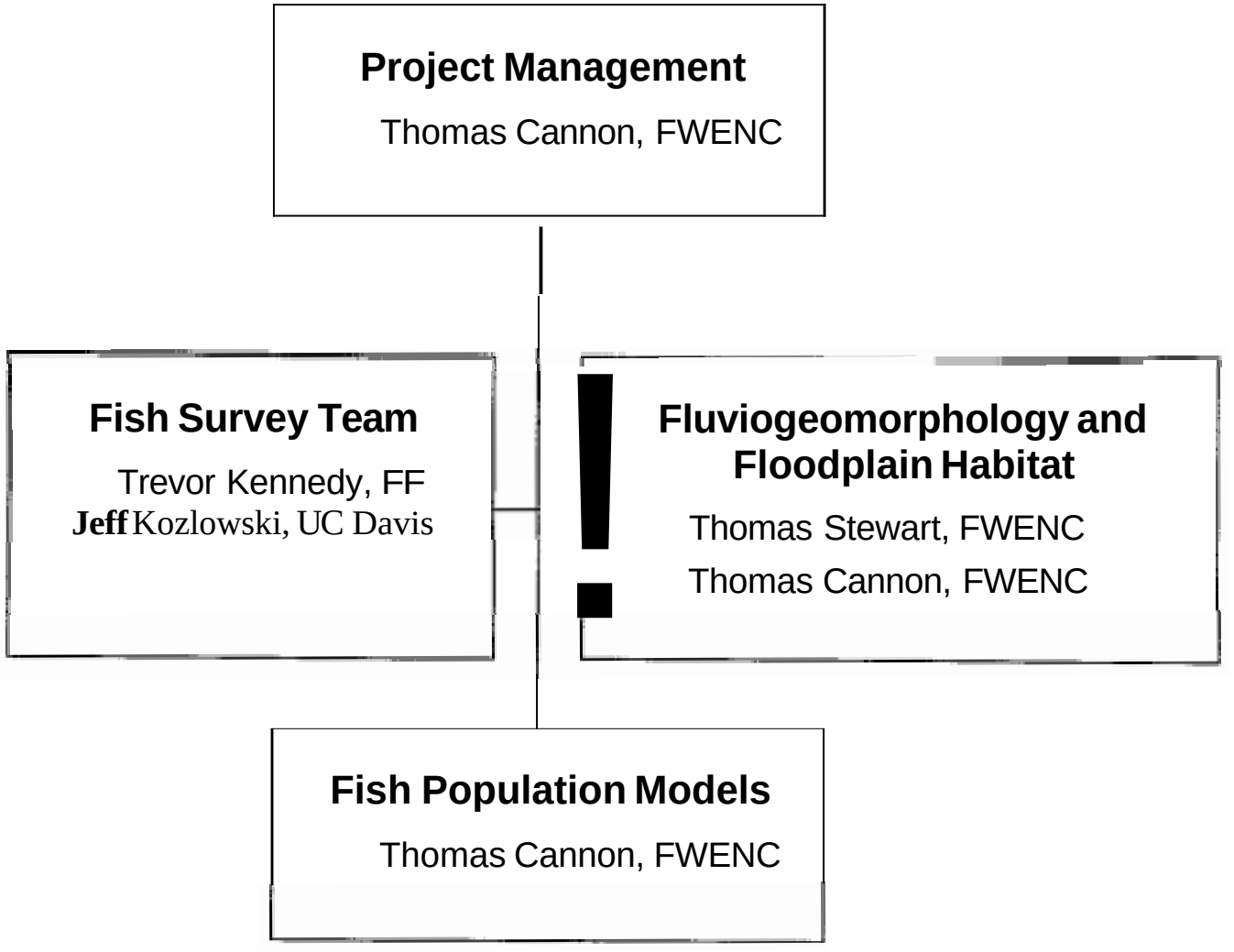


Figure 3. Project Organization

Project Management Team:
Thomas Cannon, FWENC – Mr. Cannon is proposed as project manager. He has a B.S. in fisheries and master's degrees in biology and biostatistics. He has 14 years of experience working on Central Valley and Bay-Delta fish issues. He is an experienced project manager and administrator with several dozen major projects to his credit. He participated as consultant support in the early development of CALFED's Ecosystem Restoration Program Plan including preparation of the Feather-Yuba vision. He also participated as a consultant in the AFRP study program on Butte Creek, CVPIA's CAMP program, CALFED's Upper Yuba River Study Program, and the CALFED's Delta Entrainment Effects Team (DEFT). He prepared the aquatic program plan for the Lower American River Floodway Management Plan as a consultant to SAFCA. He has contributed papers on the importance of the estuary as a nursery area to chinook salmon and on the effects of South Delta Pumping Plants and PG&E Bay-Delta power plants on salmon, steelhead, and other anadromous fish. He is an expert in sampling survey and experiment statistics, and in fish population dynamics.
Thomas Stewart, FWENC – Dr. Stewart is proposed as the fluvial geomorphology and GIS task manager. He is a fluvial geomorphologist with twenty years experience in environmental evaluation, natural and water resources management, research, and project management. His areas of expertise include: geomorphology, hydrology, watershed analysis, landscape evaluation, stream channel mapping and typing, fisheries habitat evaluation, and sensitive soil and unstable slope identification particularly for riparian and fisheries habitat protection. He has worked on a variety of river systems from small headwaters streams to large rivers systems. He has used GIS in data analysis and habitat characterization on numerous projects. His experience with large river systems includes the Eel and Mokelumne Rivers (California), Platte River (Nebraska), Mississippi River (west-central Illinois), Columbia River (Washington, Oregon, Idaho, Montana, and British Columbia), and Copper River (Alaska).

Cost

1. Budget

Proposed costs are shown in Tables 1-6. Tables are organized by tasks.

2. Project Management

Project management costs are proposed at 12 hours per month for the project manager and an assistant for the 12-month term of the project. On hour per month is proposed for a contracts manager. These costs cover contract administration, communications (phone, letter, email, fax, etc), project oversight and inspections, report review, production, and distribution, meetings, project documentation (data and reports), coordination with other programs/projects, and progress reports. The project manager will prepare and submit monthly fiscal and programmatic reports on the 10th of each month. The report will include amount invoiced to contracting agency, a description of the activities performed, problems and delays encountered, and descriptions of any amendments or modifications to the contract. The report will be emailed to the contracting entity and CALFED representatives.

3. Cost Sharing

Cost sharing will be in the form of in-kind services from the organizations cooperating with the study including DFG, DWR, and Audubon. Such support may include but is not limited to use of equipment, vehicles, support personnel, river access, facilities for meetings, etc. Support from

ongoing studies (e.g., carcass surveys, ladder fish counts, angler surveys, spawning surveys, tag studies, life history studies, etc.) on the Feather and Yuba Rivers is also essential to accomplishing the program.

Local Involvement

The proposed project has extensive local involvement processes already in place with interested parties supporting and sponsoring the project. We propose to coordinate with the Yuba River Fisheries Technical Working Group (YRFTWG) that includes stakeholder members such as South Yuba River Citizens League (SYRCL), Reclamation District (RD) 784, and YCWA. Last year's CALFED grant to Surface Water Resources Incorporated (SWRI) representing YRFTWG includes public involvement for lower Yuba River restoration planning. That effort is just beginning and will include the proposed studies. Other local involvement processes that will serve as further points of contacts include those of CALFED's Upper Yuba River Studies Program, which includes local involvement in potential effects on the lower river from potential actions at Englebright Dam. Cooperation with USACE and Reclamation Board's Comprehensive Study will also provide public involvement through that process. In addition, the DWR FERC studies involving the Oroville complex may provide a stakeholder process within which this project can participate.

Compliance with Standard Terms and Conditions

Foster Wheeler and its partners presently have contracts with CALFED's state and federal entities and no problems are anticipated with terms and conditions.

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B. Threshold Requirements (Attachments)

Environmental Compliance Checklist
Land Use Checklist
Contract Forms.
Letters of Notification

Table 1. Worksheet. Task A - Field Surveys &Floodplain Rearing

					Subject to Overhead							Exempt from Overhead		
Year	Staff	Role	Organization	Pay Rate/hr	Direct Labor Hours	Salary	Benefits	Travel (31 cents per mile travel to Yuba from Sacramento)	Supplies & Expendables (note books, disposable camera, clipboards, boat gear, personal gear)	Service Contracts	Overhead (25%)1		Equipment (heavy duty raft, snorkel gear)	Total Cos
1	T. Kennedy	Fish Biol	Fishery Foundation	30	336	10080	2520	400	250		3215		300	1676
	J. Koslowski	Fish Biol	Student Contractor	25	336	8400	2100	400	250		2690		300	1414
	Field Tech	field support	Fishery Foundation	17.5	248	4340	1085	200			1378.25		300	*730*
	Field Tech	field support	Fishery Foundation	17.5	248	4340	1085	200			1378.25		**300**	**730**
	GIS/Data	GIS/Data	FWENC	25	48	1200	300		600		1884			388
	Cannon, T	Fish Habitat	FWENC	43	80	3440	960	400	500		5400.8			10600.
	raft						0				0		**2500**	**250**
	nets/gear								1500		150		0	165
	Total				1,296	31,800	7,950	1,600	3,000	0	16,092	0	*3,700*	64,142

Footnotes:

1 Overhead is for office space. phones, cell phones, furniture, office staff support, subcontract administration, purchasing agents. general supplies. and general personnel administration.

Table 2. Worksheet - Task B - Stranding Analysis and Report														
					Subject to Overhead							Exempt from Overhead		
Year	Staff	Role	Organization	Pay Rate/hr	Direct Labor Hours	Salary	Benefits	Travel (31 cents per mile travel to Yuba from Sacramento)	Supplies & Expendables (note books, disposable camera, clipboards, boat gear, personal gear)	Service Contracts	Overhead (44%)1		Equipment (heavy duty raft. snorkel gear)	Total Cost
1	T. Kennedy	Fish Biol	Fishery Foundation	30	48	1440	360				450			2250
	J. Koslowski	Fish Biol	Student Contractor	25	48	1200	300				375			1875
	GIS/Data	GIS/Data	FWENC	25	56	1400	350		500		2198			4448
	Cannon, T	Fish Pop Dyn	FWENC	43	48	2064	516				3240			5820
	Total				200	6,104	1,526	0	500	0	6,263	0	0	14,393

Footnotes:

1 Overhead is for office space, phones, cell phones, furniture, office staff support, subcontract administration, purchasing agents, general supplies, and general personnel administration.

able 3. Worksheet. Task C - Importance to Populations

						Subject to Overhead						Exempt from Overhead		
'ear	Staff	Role	Organization	Pay Rate/hr	Direct Labor Hours	Salary	Benefits	Travel (31 cents per mile travel to Yuba from Sacramento)	Supplies & Expendables (note books, disposable camera, clipboards, boat gear, personal gear)	Service Contracts	Overhead (47%)1		Equipment (heavy duty raft. snorkel gear)	Total Cos
1	T. Kennedy	Fish Biologist	Fishery Foundation	30	24	720	180				225			1125
	J. Koslowski	Fish Biologist	Student Contractor	25	24	600	150				187.5			93
	GIS/Data	GIS/data analyst	FWENC	25	24	600	150		100		942			179
	Cannon, T	Fish Pop Dynamics	FWENC	43	48	2064	516				3240			582
	Total				120	3,984	996	0	100	0	4,595	0	0	9,675

Footnotes:

1 Overhead is for office space, phones, cell phones, furniture, office staff support. subcontract administration. purchasing agents. general supplies, and general personnel administration.

Table 4. Worksheet - Task D - Habitat Conditions Evaluation

						Subject to Overhead						Exempt from Overhead		
Year	Staff	Role	Organization	Pay Rate/hr	Direct Labor Hours	Salary	Benefits	Travel (31 cents per mile travel to Yuba from Sacramento)	Supplies & Expendables	Service Contracts	Overhead (54%)		Equipment	Total Cost
1	T. Kennedy	fish biologist	Fishery Foundation	30	32	960	240				300			1500
	J. Koslowski	fish biologist	Student Contractor	25	32	800	200				250			1250
	GIS/Data	GIS/data analyst	FWENC	25	56	1400	350		250		2198			4198
	Cannon, T	fish habitat	FWENC	43	24	1032	258				1620			2910
	Stewart, T.	fluv geomorphol	FWENC	42	162	6804	1701				10682			19349
	graphics artist	graphics	FWENC	26	48	1200	300				1884			3432
	Total				354	$12,196	$3,049	$0	$250	$0	$16,935	$0	$0	$32,640

Table 5. Worksheet - Task E - Project Management

					Subject to Overhead						Exempt from Overhead		
Year	Staff	Role	Organization	Pay Rate/hr	Direct Labor Hours	Salary	Benefits	.Travel (31 cents per mile for travel to Yuba County from Sacramento)	Supplies & Expendables (office supplies, report materials. mail, long-distance phone charges)	Service Contracts	Overhead (56% Of total)1		Equipment	Total Cost
1	Cannon, T	Project Manager	FWENC	43	56	2408	602				3781			6790.56
	Fahrenbach, D	Contracts Manager	FWENC	42	12	504	126				791			1421.28
	Proj assistant	Assistant	FWENC	15	96	1440	360				2261			4060.8
	Total				164	$4,352	$1,088	$0	50	$0	$6,833	50	50	$12,273

Footnotes:

1 Overhead is for personnel benefits, office space, phones, cell phones, furniture. office staff support, subcontract administration. purchasing agents, and general personnel administration.

Table 6.	Total Budget (CALFED funds only)										
			Subject to Overhead						Exempt from Overhead		
Year	Task	Direct Labor Hours	Salary	Benefits	Travel	Supplies & Expendables	Service Contracts	Overhead (38%)		Equipment	Total Cost
Year 1	Table 1. Worksheet - Task A - Field Surveys &Floodpla	1296	31800	7950	1600	3000	0	16092	0	3700	64142
	Table 2. Worksheet - Task B - Stranding Analysis and F	200	6104	1526	0	500	0	6263	0	0	14393
	Table 3. Worksheet - Task C - Importanceto Populatio	120	3984	996	0	100	0	4595	0	0	9675
	Table 4. Worksheet - Task D - Habitat Conditions Eva	354	12196	3049	0	250	0	16935	0	0	32640
	Table 5. Worksheet - Task E - Project Management	184	4352	1088	0	0	0	8833	0	0	12273
Total Cost Year 1		2,134	558,436	514,609	$1,600	$3,850	50	550,718	50	$3,700	5133,123

FOSTER WHEELER ENVIRONMENTAL CORPORATION

May 12,2000

Jim Manning - Director
Yuba County Department of Community Development
938 14th Street
Marysville, CA 95901

Subject: PROPOSAL TO CALFED

Foster Wheeler Environmental Corporation is submitting the attached grant proposal to CALFED to conduct scientific research on the lower Feather and Yuba Rivers. We are sending you this proposal to provide advance notification regarding research studies that may occur if the grant is awarded in your jurisdiction. Foster Wheeler would serve as project manager for the studies, which would be conducted in the lower Feather and Yuba Rivers in Yuba County.

The objective of the study are to provide technical information on fish habitat use in the floodplain of the rivers. We also hope to identify floodplain habitat enhancement measures that are compatible with improving the flood conveyance capacity of the lower rivers.

Your support and cooperation will be greatly appreciated. If you have any questions regarding the study please call me.

Sincerely,

Thomas C. Cannon

c:

3947 Lennane Drive, Suite 200, Sacramento, CA 95834-1973
Tel: 916-928-0202 Fax: 916-928-0594

FOSTER WHEELER ENVIRONMENTAL CORPORATION

May 12,2000

City of Marysville Planning Division
316 6th Street
Marysville, CA 95901

Subject: PROPOSAL TO CALFED

Foster Wheeler Environmental Corporation is submitting the attached grant proposal to **CALFED** to conduct scientific research on the lower Feather and Yuba Rivers. We are sending you this proposal to provide advance notification regarding research studies that may occur if the grant is awarded in your jurisdiction. Foster Wheeler would serve as project manager for the studies, which would be conducted in the lower Feather and Yuba Rivers in Yuba County.

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Tel: 916-928-0202 Fax: 916-928-0594

FOSTER WHEELER ENVIRONMENTAL CORPORATION

May 12, 2000

Director of Planning Division
Sutter County Community Services Department
1160 Civic Center Blvd.
Yuba City, CA 95993

Subject: PROPOSAL TO CALFED

Foster Wheeler Environmental Corporation is submitting the attached grant proposal to CALFED to conduct scientific research on the lower Feather and Yuba Rivers. We are sending you this proposal to provide advance notification regarding research studies that may occur if the grant is awarded in your jurisdiction. Foster Wheeler would serve as project manager for the studies, which would be conducted in the lower Feather and Yuba Rivers in Yuba County.

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FOSTER WHEELER ENVIRONMENTAL CORPORATION

May 12,2000

Yuba City Planning Division
City Hall,
1201 Civic Center Blvd.
Yuba City, CA 95993

Subject: PROPOSAL TO CALFED

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Sincerely,

Thomas C. Cannon

c:

3947 Lennane Drive, Suite 200, Sacramento, CA 95834-1973
Tel: 916-928-0202 Fax: 916-928-0594

Land Use Checklist

All applicants must **fill** out **this** Land **Use** Checklist **for** their **proposal.** Applications must **contain answers** to the following questions to be **responsive** and *to* be considered **for funding.** ***Failure to answer these questions and include them with the application will result*** in ***the application being considered nonresponsive and not considered for funding.***

1. **Do** the actions in the proposal involve physical changes to the land(i.e. grading, planting vegetation, or breeching levees) or restrictions in land use (i.e. conservation easement **or** placement *of* land in a wildlife refuge)?

_____	X
YES	NO

2. **If NO** *to* # 1, explain what type ofactions are involved **io** the proposal (i.e., research only, planning **only).**

   Research Only

3. If **YES** to # 1, what **is** the proposed **land** use chauge or restriction under the proposal?

4. If **YES** to # 1, is the land **currently** under **a** Williamson Act contract?

_____	_____
YES	NO

5. **If YES** to # **I, answer the** following:

   Current land **use** _____
   Current zoning _____
   Current general plan designation _____

6. **If YES to #1, is** the land classified as Prime Farmland, Farmland **of** Statewide Importance ***or*** Unique Farmland **on** the Department **of** Conservation Important Farmland Maps?

_____	_____	_____
YES	NO	DON'T KNOW

7. **If YES** to # 1, how many acres **of** land **will be** subject to **physical** change or land use restrictions under the proposal?
   _____

8. **If YES to # 1, is** the property currently being commercially **farmed or** grazed?

_____	_____
YES	NO

9. **If YES** to #8, what are the number of employees/acre_____
   the total number **of** employees _____

10. Will the **applicant** acquire any interest **in** land under the proposal (fee title **or a** conservation easement)?

YES	NO
	X

11. What entity/organization will hold the interest?_____

12. **If YES to #** 10, answer the following:

Total number of acres **to** be acquired **under proposal**	
Number ***of*** acres **to** be acquired in **fee**	
Number **of** acres ***to*** he subject **to** conservation easement	

13. For **all** proposals involving **physical changes** to the **land** or restriction **in land use,** describe what entity **or** organization will:

manage the property	
provide operations and maintenance services	
conduct monitoring	

14. **For** land acquisitions (**fee** title **or** easements), will existing water rights **also be** acquired?

YES	NO
	X

15. **Does** the **applicant** propose **any** modifications **to** the water right **or** change **in** the delivery **of *the*** water?

YES	NO
	X

16. **If YES** lo **# 15,** describe_____

Environmental Compliance Checklist

All applicants must **fill** out this Environmental Compliance Checklist. Applications **must** contain answers to the **following** questions to be responsive **and** to **be** considered **for** funding. ***Failure*** lo ***answer these questions and include them with the application will result in the application being considered nonresponsive and not considered for funding.***

1. **Do** any of the actions included in the proposal require compliance **with** either the California Environmental Quality Act **(CEQA).** the National Environmental Policy **Act** (NEPA), **or both?**

   _____ **YES** X NO

2. If you answered **yes to** # 1, identify the lead governmental agency Tor CEQA/NEPA compliance.

   _____ **Lead** Agency

3. **If you** answered no **to** # 1, **explain** why CEQA/NEPA compliance is not required for the actions **in the proposal.**

   Action **are research.**

4. If CEQA/NEPA compliance is required, describe how the project will comply with either or both **of these** laws. Describe where the project is in the compliance process and the expected detc ***of*** completion.

5. Will the applicant require ***access*** across public or private property that the applicant does not own to accomplish the **activities in the proposal?**

   X **YES** _____ **NO**

   If **yes** the applicant must attach written permission **for** access from the relevant property owner(s). Failure **to** include written permission **for** access may result in disqualification **of** the proposal during the review process. **Research and** monitoring field projects Ior which specific field locations have not been identified **will be** required **to provide** access needs **and** permission for **access** with ***30*** days **of** notification **of** approval.

6. Please indicate what permits or other approvals may **be required for** the activities contained in **your proposal.** Check all boxes that apply.

LOCAL

Conditional **use** permit	—	
Variance	—	
Subdivision Map Act approval	—	
Grading permit	—	
General **plan** amendment	—	
Specific plan approval	—	
Rezone		—
Williamson Art Contract cancellation	—	
Other _____ (please specify)		
None required	—	

CESA Compliance	—	**(CDFG)**
Streambed **alteration** permit	—	**(CDFG)**
CWA § 401 certification	—	**(RWQCB)**
Coastal development **permit**	—	(Coastal **Commission/BCDC**)
Reclamation Board **approval**	—	
Notification	—	**(DPC, BCDC)**
Other **Research and Monitoring** (please specify)		
None required	—	

FEDERAL

ESA Consultation	—	**(USFWS)**
Rivers & Harbors Act permit	—	**(ACOE)**
CWA § 404 µcrmit	—	**(ACOE)**
Other **Research permits for Endangered species** (please sprcily)		
Sone required	—	

DPC = Delta Protection Commission
CWA = Clean Water Act
CESA = California Endangered Species Act
USFWS = U.S. Fish and Wildlife Service
ACOE = U.S. Army Corps of Engineers

ESA = Endangered **Species** Act
CDFG = California Department **of** Fisb **and Game**
RWQCB = Regional **Water** Quality **Control** Board
BCDC = **Bay** Conservation and **Development** Comm.

OMB Approval No. 0348-0040

ASSURANCES - NON-CONSTRUCTION PROGRAMS

PLEASE DO NOT RETURN YOUR COMPLETED FORM TO THE OFFICE OF MANAGEMENT AND BUDGET. SEND IT TO THE ADDRESS PROVIDED BY THE SPONSORING AGENCY.

NOTE Certain of these assurances may not be applicable to your project or program. If you have questions, please contact the awarding agency. Further, certain Federal awarding agencies may require applicants to certify to additional assurances. If such is the case, you will be notified.

As the duly authorized representative of the applicant, I certify that the applicant:

1. Has the legal authority *to* apply for Federal assistance and the institutional, managerial and financial capability (including funds sufficient to pay the non-Federal share of project cost) *to* ensure proper planning, management and completion of the project described in this application.

2. Will give the awarding agency, the Comptroller General of the United States and, if appropriate, the State, through any authorized representative, access to and the right to examine all records, books, papers, or documents related to the award; and will establish a proper accounting system in accordance with generally accepted accounting standards or agency directives.

3. Will establish safeguards to prohibit employees from using their positions for a purpose that constitutes or presents the appearance of personal or organizational conflict of interest, or personal gain.

4. Will initiate and complete the work within the applicable time frame after receipt of approval of the awarding agency.

5. Will comply with the Intergovernmental Personnel Act of 1970 (42 U.S.C. §§4728-4763) relating to prescribed standards for merit systems for programs funded under one of the 19 statutes or regulations specified in Appendix A of OPM's Standards for a Merit System of Personnel Administration (5 C.F.R. 900, Subpart F).

6. Will comply with all Federal statutes relating to nondiscrimination. These include but are not limited to: (a) Title VI of the Civil Rights Act of 1964 (P.L. 88-352) which prohibits discrimination on the basis of race, color or national origin; (b) Title IX of the Education Amendments of 1972. as amended (20 U.S.C. §§1681-1683, and 1685-1686), which prohibits discrimination on the basis of **sex;** (c) Section 504 of the Rehabilitation Act of 1973, as amended (29 U.S.C. §794), which prohibits discrimination on the basis of handicaps; (d) the Age Discrimination Act of 1975. as amended (42 U.S.C. §§6101-6107), which prohibits discrimination on the basis of age; (e) the Drug Abuse Office and Treatment Act of 1972 (P.L. 92-255). as amended, relating *to* nondiscrimination on the basis of drug abuse; (f) the Comprehensive Alcohol Abuse and Alcoholism Prevention, Treatment and Rehabilitation Act of 1970 (P.L. 91-616), as amended, relating ***to*** nondiscrimination on the basis of alcohol abuse or alcoholism; (g) §§523 and 527 of the Public Health Service Act of 1912 (42 U.S.C. §§290 dd-3 and 290 ee 3), as amended, relating to confidentiality of alcohol and drug abuse patient records; (h) Title VIII of the Civil Rights Act of 1968 (42 U.S.C. §§3601 et seq.), as amended, relating to nondiscrimination in the sale, rental or financing of housing; (i) any other nondiscrimination provisions in the specific statute(s) under which application for Federal assistance is being made; and, (j) the requirements of any other nondiscrimination statute(s) which may apply to the application.

7. Will comply, or has already complied, with the requirements of Titles II and III of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (P.L. 91-646) which provide for fair and equitable treatment of persons displaced or whose property is acquired as a result of Federal or federally-assisted programs. These requirements apply ***to*** all interests in real property acquired for project purposes regardless of Federal participation in purchases.

8. Will comply, as applicable, with provisions of the Hatch Act (5 U.S.C. §§1501-1508 and 7324-7328) which limit the political activities of employees whose principal employment activities are funded in whole or in Dart with Federal funds.

9. Will comply, as applicable, with the provisions of the Davis-Bacon Act (40 U.S.C. §§276a to 276a-7), the Copeland Act (40 U.S.C. §276c and 18 U.S.C. §874), and the Contract Work Hours and Safety Standards Act (40 U.S.C. §§327-333). regarding labor standards for federally-assisted construction subagreements.

10. Will comply, if applicable, with flood insurance purchase requirements of Section 102(a) of the Flood Disaster Protection Act of 1973 (P.L. 93-234) which requires recipients in a special flood hazard area *to* participate in the program and to purchase flood insurance if the total cost of insurable construction and acquisition is $10,000 or more.

11. Will comply with environmental standards which may be prescribed pursuant to the following: (a) institution of environmental quality control measures under the National Environmental Policy Act of 1969 (P.L. 91-190) and Executive Order (EO) 11514; (b) notification of violating facilities pursuant to EO 11738; (c) protection of wetlands pursuant to EO 11990; (d) evaluation of flood hazards in floodplains in accordance with EO 11988; (e) assurance of project consistency with the approved State management program developed under the Coastal Zone Management Act of 1972 (16 U.S.C. §§1451 et seq.); (f) conformity of Federal actions to State (Clean Air) Implementation Plans under Section 176(c) of the Clean Air Act of 1955, as amended (42 U.S.C. §§7401 et seq.); (g) protection of underground sources of drinking water under the Safe Drinking Water Act of 1974, as amended (P.L. 93-523); and, (h) protection of endangered species under the Endangered Species Act of 1973, as amended (P.L. 93-205).

12. Will comply with the Wild and Scenic Rivers Act of 1968 (16 U.S.C. §§1271 et seq.) related to protecting components or potential components of the national wild and scenic rivers system.

13. Will assist the awarding agency in assuring compliance with Section 106 of the National Historic Preservation Act of 1966, as amended (16 U.S.C. §470), EO 11593 (identification and protection of historic properties), and the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§469a-1 et seq.).

14. Will comply with P.L. 93-348 regarding the protection of human subjects involved in research, development. and related activities supported by this award of assistance.

15. Will comply with the Laboratory Animal Welfare Act of 1966 (P.L. 89-544, as amended, 7 U.S.C. §§2131 et seq.) pertaining to the care, handling, and treatment of warm blooded animals held for research, teaching, or other activities supported by this award of assistance.

16. Will comply with the Lead-Based Paint Poisoning Prevention Act (42 U.S.C. §§4801 et seq.) which prohibits the use of lead-based paint in construction or rehabilitation of residence structures.

17. Will cause to be performed the required financial and compliance audits in accordance with the Single Audit Act Amendments of 1996 and OMB Circular No. A-133, "Audits of States, Local Governments, and Non-Profit Organizations."

18. Will comply with all applicable requirements of all other Federal laws, executive orders, regulations, and policies governing this program.

SIGNATURE OF AUTHORIZED CERTIFYING OFFICIAL	TITLE
J. Tyler Thrasher	OPERATIONS MANAGER
APPLICANT ORGANIZATION	DATE SUBMITTED
FOSTER WHEELER ENVIRONMENTAL CORPORATION	5/15/00

Standard Form 424B (Rev. 7-97) Back

STATE OF CALIFORNIA

NONDISCRIMINATION COMPLIANCE STATEMENT

STD. 19 (REV. 3-95) FMC

COMPANY NAME

Foster Wheeler Environmental Corporation

The company named above (hereinafter referred to as "prospective contractor") hereby certifies, unless specifically exempted, compliance with Government Code Section 12990 (a-f) and California Code of Regulations, Title 2, Division 4, Chapter 5 in matters relating to reporting requirements and the development, implementation and maintenance of a Nondiscrimination Program. Prospective contractor agrees not to unlawfully discriminate, harass or allow harassment against any employee or applicant for employment because of sex, race, color, ancestry, religious creed, national origin, disability (including HIV and AIDS), medical condition (cancer), age, marital status, denial of family and medical care leave and denial of pregnancy disability leave.

CERTIFICATION

I, the official named below hereby swear that I am duly authorized to legally bind the prospective contractor to the above described certification. I am fully aware that this certification, executed on the date and in the county below, is made under penalty of perjury under the laws of the State of California

OFFICIAL'S NAME

G. Lynn Sprague

DATE EXECUTED

May 15, 2000

EXECUTED IN THE COUNTY OF

Sacramento County

PROSPECTIVE CONTRACTOR'S SIGNATURE

G. Lynn Sprague

PROSPECTIVE CONTRACTOR'S TITLE

Northern California Operations Manager

PROSPECTIVE CONTRACTOR'S LEGAL BUSINESS NAME

Foster Wheeler Environmental Corporation

APPLICATION **FOR** FEDERAL ASSISTANCE

OMB Approval No. 0348-0043

2. DATE SUBMITTED	Applicant Identifier
3. DATE RECEIVED BY STATE	State Application Identifier
4. DATE RECEIVED BY FEDERAL AGENCY	Federal Identifier

1. TYPE OF SUBMISSION:
Application: ☐ Construction ☒ Non-Construction
Preapplication: ☐ Construction ☐ Non-Construction

5. APWCANT INFORMATION

Legal Name:
.Foster Wheeler Environmental Comoration

Organizational Unit:

Address *(give city, county, State, and zip code):*
3947 Lennane Drive, Suite 200
Sacramento, CA **95843**

Name and telephone number of person to be contacted on matters involvi this application *(give area code)* Thomas C. Cannon
916-928-0202

6. EMPLOYER IDENTIFICATION NUMBER *(EIN):*
7 5 - 2 5 1 1 2 4 5 0

7. TYPE OF APPLICANT: *(enter appropriate letter in box)* ☐

A. State — H. Independent School Dist.
8. County — I. State Controlled Institution of Higher Learning
C. Municipal — J. Private University
D, Township — K. Indian Tribe
E. Interstate — L. Individual
F. Intermunicipal — M. Profit Organization
G. Special District — N. Other (Specify)_____

8. TYPE OF APPLICATION:
☐ New ☐ Continuation ☐ Revision
If Revision, enter appropriate letter(s) in box(es) ☐ ☐
A. Increase Award B. Decrease Award C. Increase Duration
O. Decrease Duration Other *(specify):*

9. NAME OF FEOERAL AGENCY

10. CATALOG *OF* FEOERAL **DOMESTIC** ASSISTANCE NUMBER: XX – XXX
TITLE:

11. DESCRIPTIVE TITLE OF APPLICANTS PROJECT: Evaluation Central Valley Floodplain Fish Rearing Habitat and P ential Losses From Stranding: A Proposal to Conduct a Ma itoring and Research Program to Identify the Nature and Ext t of Salmon, Steelhead, and Splittail Us of Floodplain Habil s and and Potential for Stranding on the Lower Feather and Yuba Rivers in Yuba and Sutter Counties , California.

12. AREAS AFFECTED BY PROJECT *(Cities, Counties, States, etc.):*
Sutter and Yuba counties

13. PROPOSED PROJECT

14. CONGRESSIONAL DISTRICTS OF:
California Fifth Congressional District

Start Dale	Ending Date	(a. Applicant	b. Project
1/1/2001	12/31/2001	Foster Wheeler Environmental Corp.	Evaluation of Central Valley Floodplain Fish Rearin Habita

15. ESTIMATED FUNDING:

a. Federal	$ 133,123 .00
b. Applicant	$ .00
c. State	$ .00
d. Local	$ .00
e. Other	$ .00
f. Program Income	$ .00
g. TOTAL	$ 133,123 .00

16. IS APPLICATION SUBJECT TO REVIEW BY STATE EXECUTIVE ORDER 12372 PROCESS?

a. YES. THIS PREAPPLICATION/APPLICATION WAS MADE AVAILABLE TO THE STATE EXECUTIVE ORDER 12372 PROCESS FOR REVIEW O N

DATE _____

b. NO. ☐ PROGRAM IS NOT COVERED BY E. O. 12372
☐ OR PROGRAM HAS NOT BEEN SELECTED BY STATE FOR REVIEW

17. IS THE APPLICANT DELINQUENT ON ANY FEDERAL DEBT?
☐ Yes If "Yes," *attach* an explanation. ☒ No

18. TO THE BEST OF MY KNOWLEDGE AND BELIEF, ALL DATA IN THIS APPLICATION/PREAPPLICATION ARE TRUE AND CORRECT, THE DOCUMENT HAS BEEN DULY AUTHORIZED BY THE GOVERNING BODY OF THE APPLICANT AND THE A P W C A M WILL COMPLY WITH THE ATTACHED ASSURANCES IF THE ASSISTANCE IS AWARDED.

a. Type Name of Authorized Representative	b. Title	c. Telephone Number
G. Lynn Sprague	Operations Manager	(916) 928-0202
d. Signature of Authorized Representative		e. Date Signed
G. Lynn Sprague		5/15/00

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Prescribed by OMB Circular A-102

BUDGET INFORMATION - Non-Construction Programs

OMB Approval No. 0348.0044

SECTION A - BUDGET SUMMARY

Grant Program or Activity	Catalog of Federal Domestic Assistance Number (b)	Estimated Unobligated Funds		New or Revised Budget		
		Federal (c)	Non-Federal (d)	Federal (e)	Non-Federal (f)	Total (g)
1.		$	$	$	$	$
2.						
3.						
4.						
5. Totals		$	$	$	$	$

SECTION B - BUDGET CATEGORIES

6. Object Class Categories	GRANT PROGRAM, FUNCTION OR ACTIVITY				Total
	(1) Proposal	(2)	(3)	(4)	(5)
a. Personnel	$ 58,436	$	$	$	$ 58,436
b. Fringe Benefits	14,609				14,609
c. Travel	1,600				1,600
d. Equipment	3,700				3,700
e. Supplies	3,850				3,850
f. Contractual					
g. Construction					
h. Other					
i. Total Direct Charges *(sum of 6a-6h)*	82,195				82,195
j. Indirect Charges	50,718				50,718
k. TOTALS *(sum of 6i and 6j)*	$133,123	$	$	$	$ 133,123
7. Program Income	$	$	$	$	$

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SECTION C - NON-FEDERAL RESOURCES				
(a) Grant Program	(b) Applicant	(c) State	(d) Other Sources	(e) TOTALS
	$	$	$	$
9.				
10.				
11.				
12. TOTAL *(sum of lines 8-11)*	$	$	$	$

SECTION D - FORECASTED CASH NEEDS					
	Total for 1st Year	1st Quarter	2nd Quarter	3rd Quarter	4th Quarter
13. Federal	$ 133,123	$ 25,000	$ 25,000	$ 30,000	$ 53,000
14. Non-Federal					
15. TOTAL *(sum of lines 13 and 14)*	$ 133,123	$ 25,000	$ 25,000	$ 30,000	$ 53,000

SECTION E - BUDGET ESTIMATES OF FEDERAL FUNDS NEEDED FOR BALANCE OF THE PROJECT				
(a) Grant Program	FUTURE FUNDING PERIODS (Years)			
	(b) First	(c) Second	(d) Third	(e) Fourth
16.	$	$	$	$
17.				
18.				
19.				
20. TOTAL *(sum of lines 16-19)*	$	$	$	$

SECTION F - OTHER BUDGET INFORMATION	
21. Direct Charges:	22. Indirect Charges:
23. Remarks:	